AT A MINIMUM, GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH NECA 1 (LATEST EDITION), "STANDARD PRACTICES FOR GOOD

16A MANUFACTURERS

WORKMANSHIP IN ELECTRICAL CONSTRUCTION".

IN OTHER ARTICLES WHERE LISTS OF MANUFACTURERS ARE INTRODUCED, SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE

WHERE A LIST IS PROVIDED, MANUFACTURERS ARE LISTED ALPHABETICALLY AND NOT IN ACCORDANCE WITH ANY RANKING OR PREFERENCE.

WHERE MANUFACTURERS ARE NOT LISTED. PROVIDE PRODUCTS SUBJECT TO COMPLIANCE WITH REQUIREMENTS FROM MANUFACTURERS THAT HAVE BEEN ACTIVELY INVOLVED IN MANUFACTURING THE SPECIFIED PRODUCT FOR NO LESS

### 16A COORDINATION

COORDINATE ALL WORK WITH OTHER DIVISIONS AND TRADES SO THAT VARIOUS COMPONENTS OF THE ELECTRICAL SYSTEMS ARE INSTALLED AT THE PROPER TIME, FIT THE AVAILABLE SPACE, AND ALLOW PROPER SERVICE ACCESS TO ALL EQUIPMENT. REFER TO ALL DRAWINGS, INCLUDING, BUT NOT LIMITED TO, CIVIL, ARCHITECTURAL, STRUCTURAL, MECHANICAL, AND PLUMBING, AND TO RELEVANT EQUIPMENT SUBMITTALS AND SHOP DRAWINGS TO DETERMINE THE EXTENT OF CLEAR SPACES. MAKE ALL OFFSETS REQUIRED TO CLEAR EQUIPMENT, BEAMS AND OTHER STRUCTURAL MEMBERS, AND TO FACILITATE CONCEALING RACEWAYS IN THE MANNER ANTICIPATED IN THE DESIGN. PROVIDE MATERIALS WITH TRIM THAT WILL FIT PROPERLY THE TYPES OF CEILING, WALL, OR FLOOR FINISHES ACTUALLY INSTALLED.

### 16A ORDINANCES, CODES, AND STANDARDS

COMPLY, AT A MINIMUM, WITH NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS, STATE AND LOCAL BUILDING CODES, AND ALL OTHER APPLICABLE CODES AND ORDINANCES FOR PERFORMANCE, WORKMANSHIP, EQUIPMENT, AND MATERIALS. ADDITIONALLY, COMPLY WITH RULES AND REGULATIONS OF PUBLIC UTILITIES AND MUNICIPAL DEPARTMENTS AFFECTED BY CONNECTION OF SERVICES.

WHERE CONFLICTS BETWEEN VARIOUS CODES, ORDINANCES, RULES, AND REGULATIONS EXIST, COMPLY WITH THE MOST STRINGENT. WHEREVER REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, EXCEED THOSE OF THE ABOVE ITEMS, THE REQUIREMENTS OF THESE SPECIFICATIONS, DRAWINGS, OR BOTH, SHALL GOVERN. CODE COMPLIANCE, AT A MINIMUM, IS MANDATORY. CONSTRUE NOTHING IN THESE CONSTRUCTION DOCUMENTS AS PERMITTING WORK NOT IN COMPLIANCE, AT A MINIMUM, WITH THESE CODES.

PROMPTLY BRING ALL CONFLICTS OBSERVED BETWEEN CODES, ORDINANCES, RULES, REGULATIONS, REFERENCED STANDARDS, AND THESE DOCUMENTS TO THE ENGINEER'S ATTENTION FOR FINAL RESOLUTION. CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY VIOLATION OF THE LAW.

PROVIDE AND MAINTAIN ALL NECESSARY SIGNAL LIGHTS AND GUARDS FOR THE SAFETY OF THE PUBLIC. OBTAIN AND PAY FOR ALL PERMITS FOR WORK IN THIS

## 16A PROTECTION OF EQUIPMENT AND MATERIALS

STORE AND PROTECT FROM DAMAGE EQUIPMENT AND MATERIALS DELIVERED TO JOB SITE, IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS. FOR MATERIALS AND EQUIPMENT SUSCEPTIBLE TO CHANGING WEATHER CONDITIONS, DAMPNESS, OR TEMPERATURE VARIATIONS, STORE INSIDE IN CONDITION SPACES. FOR MATERIALS AND EQUIPMENT NOT SUSCEPTIBLE TO THESE CONDITIONS, COVER WITH WATERPROOF, TEAR-RESISTANT, HEAVY TARP OR POLYETHYLENE PLASTIC AS REQUIRED TO PROTECT FROM PLASTER, DIRT, PAINT, WATER, OR PHYSICAL DAMAGE. EQUIPMENT AND MATERIAL THAT HAS BEEN DAMAGED BY CONSTRUCTION ACTIVITIES WILL BE REJECTED, AND CONTRACTOR SHALL FURNISH NEW EQUIPMENT AND MATERIAL OF A LIKE KIND.

PLUG OR CAP OPEN ENDS OF CONDUITS WHILE STORED AND INSTALLED DURING CONSTRUCTION WHEN NOT IN USE TO PREVENT THE ENTRANCE OF DEBRIS INTO THE SYSTEMS.

# 16A SUBSTITUTIONS

INCLUDE IN THE BASE BID THE PRODUCTS SPECIFICALLY NAMED IN THESE SPECIFICATIONS OR ON THE DRAWINGS. SUBMIT, IN THE FORM OF ALTERNATES, WITH BID. PRODUCTS OF ANY OTHER MANUFACTURERS FOR SIMILAR USE. PROVIDED THE DIFFERENCES IN COST, IF ANY, ARE INCLUDED FOR EACH PROPOSED ALTERNATE.

PRIOR TO THE BID DATE, SUBSTITUTIONS WILL NOT BE CONSIDERED UNLESS SUBMITTED FOR ENGINEER'S REVIEW, AT LEAST TEN CALENDAR DAYS PRIOR TO THE DATE FOR RECEIPT OF BIDS. INCLUDE THE NAME OF THE MATERIAL OR EQUIPMENT FOR WHICH IT IS TO BE SUBSTITUTED AND A COMPLETE DESCRIPTION OF THE PROPOSED SUBSTITUTE INCLUDING CUTSHEETS, PHOTOMETRIC DATA, AND ALL OTHER INFORMATION NECESSARY FOR AN EVALUATION FOR EACH SUCH REQUEST PROVIDE FACTORY GENERATED POINT-BY-POINT CALCULATIONS FOR ALL EXTERIOR LIGHT FIXTURES (PHOTOMETRIC FILES SUPPLIED SO THE ENGINEER CAN GENERATE A POINT-BY-POINT DO NOT SUFFICE FOR THE POINT-BY-POINT CALCULATIONS). PROVIDE INTERIOR POINT-BY-POINT CALCULATIONS AT THE DISCRETION OF THE ENGINEER. SUBMIT A \$100.00 REVIEW FEE TO THE ENGINEER WITH EACH SUCH POINT-BY-POINT CALCULATION FOR USE OF ELECTRONIC BASE FILES.

AFTER THE BID DATE, PROPOSALS TO SUBSTITUTE LIGHT FIXTURES FOR THOSE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN, WILL ONLY BE CONSIDERED AS A DEDUCT. SUBMIT PROPOSED SUBSTITUTIONS SEPARATELY, IN SUBMITTAL FORM, WITH A LIST OF PROPOSED SUBSTITUTIONS TOGETHER WITH A DEDUCT PRICE FOR EACH SUBSTITUTION. THE ENGINEER WILL THEN REVIEW THE PROPOSED SUBSTITUTIONS.

THE ENGINEER WILL HAVE THE FINAL AUTHORITY AS TO WHETHER THE LIGHT FIXTURE IS AN ACCEPTABLE REPLACEMENT TO THE SPECIFIED ITEM. THE PROPOSED SUBSTITUTION MAY ALSO BE REJECTED BY THE ARCHITECT, THE ENGINEER OR THE OWNER FOR AESTHETIC REASONS IF FELT NECESSARY OR DESIRABLE. IN THE EVENT THE PROPOSED SUBSTITUTIONS HEREIN DESCRIBED ARE REJECTED, FURNISH THE SPECIFIED ITEM.

# 16A SUBMITTALS

ASSEMBLE AND SUBMIT FOR ENGINEER'S REVIEW, MANUFACTURERS' PRODUCT LITERATURE FOR MATERIAL AND EQUIPMENT TO BE FURNISHED, INSTALLED, OR BOTH, UNDER THIS DIVISION, INCLUDING SHOP DRAWINGS, MANUFACTURERS' PRODUCT DATA AND PERFORMANCE SHEETS, SAMPLES, AND OTHER SUBMITTALS REQUIRED BY THIS DIVISION. HIGHLIGHT, MARK, LIST OR INDICATE THE MATERIALS PERFORMANCE CRITERIA AND ACCESSORIES THAT ARE BEING PROPOSED. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1; HOWEVER, AT A MINIMUM,

SUBMIT SEVEN (7) SETS. BEFORE SUBMITTING, VERIFY THAT ALL MATERIALS AND EQUIPMENT SUBMITTED ARE MUTUALLY COMPATIBLE AND SUITABLE FOR THE INTENDED USE, FIT THE AVAILABLE SPACES, AND ALLOW AMPLE AND CODE-REQUIRED ROOM FOR ACCESS AND MAINTENANCE. SUBMITTALS SHALL CONTAIN THE FOLLOWING INFORMATION. SUBMITTALS NOT SO IDENTIFIED WILL BE RETURNED TO THE CONTRACTOR WITHOUT ACTION:

### THE PROJECT NAME.

THE APPLICABLE SPECIFICATION SECTION AND PARAGRAPH.

### THE SUBMITTAL DATE.

THE CONTRACTOR'S STAMP, WHICH SHALL CERTIFY THAT THE STAMPED DRAWINGS HAVE BEEN CHECKED BY THE CONTRACTOR, COMPLY WITH THE DRAWINGS AND SPECIFICATIONS, AND HAVE BEEN COORDINATED WITH OTHER TRADES.

SUBMITTALS AND SHOP DRAWINGS SHALL NOT CONTAIN HEI'S FIRM NAME OR LOGO, NOR SHALL IT CONTAIN THE HEI'S ENGINEERS' SEAL AND SIGNATURE. THEY SHALL NOT BE COPIES OF HEI'S WORK PRODUCT.

SUBMITTALS AS SOON AS POSSIBLE AFTER NOTICE TO PROCEED AND BEFORE CONSTRUCTION STARTS. THE ENGINEER'S SUBMITTAL REVIEWS WILL NOT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN DIMENSIONS, DETAILS, SIZE OF MEMBERS, OR QUANTITIES; OR FOR OMITTING COMPONENTS OR FITTINGS;

CONTRACTOR SHALL NOTIFY THE ARCHITECT AND ENGINEER THAT THE SHOP DRAWINGS HAVE BEEN POSTED. IF ELECTRONIC SUBMITTAL PROCEDURES ARE NOT DEFINED IN DIVISION 1, CONTRACTOR SHALL INCLUDE THE WEBSITE, USER NAME ENGINEER REVIEW TIME AS SPECIFIED ABOVE IN THE CONSTRUCTION SCHEDULE. CONTRACTOR SHALL SUBMIT ONLY THE DOCUMENTS REQUIRED TO PURCHASE THE MATERIALS AND/OR EQUIPMENT IN THE ELECTRONIC SUBMITTAL AND SHALL CLEARLY INDICATE THE MATERIALS, PERFORMANCE CRITERIA AND ACCESSORIES BEING PROPOSED. GENERAL PRODUCT CATALOG DATA NOT SPECIFICALLY NOTED TO BE PART OF THE SPECIFIED PRODUCT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.

## 16A ELECTRONIC DRAWING FILES

IN PREPARATION OF SHOP DRAWINGS OR RECORD DRAWINGS, CONTRACTOR MAY, AS AN OPTION, OBTAIN ELECTRONIC DRAWING FILES IN AUTOCAD OR DXF FORMAT FROM THE ENGINEER FOR A SHIPPING AND HANDLING FEE OF \$200 FOR A DRAWING SET UP TO 12 SHEETS AND \$15 PER SHEET FOR EACH ADDITIONAL SHEET. CONTACT THE ARCHITECT FOR WRITTEN AUTHORIZATION; AND, CONTACT THE ENGINEER TO OBTAIN THE NECESSARY RELEASE AGREEMENT FORM AND TO INDICATE THE DESIRED SHIPPING METHOD AND DRAWING FORMAT. IN ADDITION TO PAYMENT, ARCHITECT'S WRITTEN AUTHORIZATION AND ENGINEER'S RELEASE AGREEMENT FORM MUST BE RECEIVED BEFORE ELECTRONIC DRAWING FILES WILL BE SENT.

## 16A OPERATION AND MAINTENANCE INSTRUCTIONS

SUBMIT FOR ENGINEER'S REVIEW, COPIES EACH OF OPERATIONS AND MAINTENANCE INSTRUCTION MANUALS, APPROPRIATELY BOUND INTO MANUAL FORM INCLUDING APPROVED COPIES OF THE FOLLOWING, REVISED IF NECESSARY TO SHOW SYSTEM AND EQUIPMENT AS ACTUALLY INSTALLED. PROVIDE THE NUMBER OF SUBMITTALS REQUIRED BY DIVISION 1; HOWEVER, AT A MINIMUM, SUBMIT THREE (3) SETS, AND INCLUDE, AT A MINIMUM, THE FOLLOWING INFORMATION:

MANUFACTURERS' CATALOGS AND PRODUCT DATA SHEETS

# WIRING DIAGRAMS

MAINTENANCE INSTRUCTIONS

# OPERATING INSTRUCTIONS

PROVIDED OR FURNISHED OR INSTALLED UNDER THIS CONTRACT.

REQUESTS FOR SUBSTANTIAL COMPLETION. ALSO PROVIDE ADEQUATE VERBAL INSTRUCTIONS OF SYSTEM OPERATIONS TO OWNER'S REPRESENTATIVE AT THE

# 16A WARRANTIES

WARRANT EACH SYSTEM AND EACH ELEMENT THEREOF AGAINST ALL DEFECTS DUE TO FAULTY WORKMANSHIP, DESIGN OR MATERIAL FOR A PERIOD OF 12 MONTHS FROM DATE OF SUBSTANTIAL COMPLETION, UNLESS SPECIFIC ITEMS ARE NOTED TO CARRY A LONGER WARRANTY IN THE CONSTRUCTION DOCUMENTS OR MANUFACTURER'S STANDARD WARRANTY EXCEEDS 12 MONTHS. REMEDY ALL DEFECTS, OCCURRING WITHIN THE WARRANTY PERIOD(S), AS STATED IN THE GENERAL CONDITIONS AND DIVISION 1.

ALSO WARRANT THE FOLLOWING ADDITIONAL ITEMS:

ALL RACEWAYS ARE FREE FROM OBSTRUCTIONS, HOLES, CRUSHING, OR BREAKS OF ANY NATURE.

THE ENTIRE ELECTRICAL SYSTEM IS FREE FROM ALL SHORT CIRCUITS AND UNWANTED OPEN CIRCUITS AND GROUNDS.

THE ABOVE WARRANTIES SHALL INCLUDE LABOR AND MATERIAL. MAKE REPAIRS OR

PERFORM THE REMEDIAL WORK PROMPTLY, UPON WRITTEN NOTICE FROM THE ENGINEER OR OWNER.

AT THE TIME OF SUBSTANTIAL COMPLETION, DELIVER TO THE OWNER ALL WARRANTIES, IN WRITING AND PROPERLY EXECUTED, INCLUDING TERM LIMITS FOR WARRANTIES EXTENDING BEYOND THE ONE YEAR PERIOD, EACH WARRANTY INSTRUMENT BEING ADDRESSED TO THE OWNER AND STATING THE

## 16A MISCELLANEOUS REMODELING WORK

PROVIDE ALL DEMOLITION OF EXISTING ELECTRICAL SYSTEMS AND NEW ELECTRICAL SYSTEM MODIFICATIONS REQUIRED BECAUSE OF BUILDING REMODELING, AS NOTED ON THE DRAWINGS, OR NECESSARY FOR PROPER OPERATION AND NEW CONSTRUCTION. REMOVE ALL ABANDONED CABLES AND WIRING ABOVE ACCESSIBLE CEILINGS AND VENTILATION SHAFTS.

## 16A ELECTRICAL WORK

### 16A BUILDING OPERATION

COMPLY WITH THE SCHEDULE OF OPERATIONS AS OUTLINED IN THE ARCHITECTURAL PORTIONS OF THIS SPECIFICATION. BUILDING SHALL BE IN CONTINUOUS OPERATION. ACCOMPLISH WORK THAT REQUIRES INTERRUPTION OF BUILDING OPERATION AT A TIME WHEN THE BUILDING IS NOT IN OPERATION, AND ONLY WITH WRITTEN APPROVAL OF BUILDING OWNER AND/OR TENANT. COORDINATE INTERRUPTION OF BUILDING OPERATION WITH THE OWNER AND/OR TENANT A MINIMUM OF 7 DAYS IN ADVANCE OF WORK.

### 16A COINCIDENTAL DAMAGE

REPAIR ALL STREETS, SIDEWALKS, DRIVES, PAVING, WALLS, FINISHES, AND OTHER FACILITIES DAMAGED IN THE COURSE OF THIS WORK. REPAIR MATERIALS SHALL MATCH EXISTING CONSTRUCTION. ALL BACKFILLING AND REPAIRING SHALL MEET ALL REQUIREMENTS OF THE OWNER, CITY AND OTHERS HAVING JURISDICTION. REPAIR WORK SHALL BE THOROUGHLY FIRST CLASS. CONFORM TO ALL REQUIREMENTS OF DIVISION 2 OF THESE SPECIFICATIONS.

### 16A CUTTING AND PATCHING

FOLLOWING THE REQUIREMENTS IN DIVISION 1, CUT WALLS, FLOORS, CEILINGS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED TO PERFORM WORK UNDER THIS DIVISION. OBTAIN PERMISSION OF THE ENGINEER, OWNER, OR BOTH, BEFORE DOING ANY CUTTING. CUT ALL HOLES AS SMALL AS POSSIBLE. PATCH WALLS, FLOORS, AND OTHER PORTIONS OF THE FACILITY AS REQUIRED BY WORK UNDER THIS DIVISION. ALL PATCHING SHALL BE THOROUGHLY FIRST CLASS AND SHALL MATCH THE ORIGINAL MATERIAL AND CONSTRUCTION, INCLUDING FIRE RATINGS IF APPLICABLE.

COORDINATE WITHOUT DELAY ALL ROUGHING-IN WITH OTHER DIVISIONS. CONCEAL ALL RACEWAYS EXCEPT IN UNFINISHED AREAS AND WHERE OTHERWISE INDICATED ON THE DRAWINGS.

## 16A SUPPORT SYSTEMS

1. STEEL SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY; 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH; COOPER B-LINE, ERICO INTERNATIONAL CORPORATION, HILTI, INC., POWER-STRUT, THOMAS & BETTS CORPORATION, UNISTRUT.

A. METALLIC COATINGS: HOT-DIP GALVANIZED AFTER FABRICATION AND APPLIED ACCORDING TO MFMA-3.

B. NONMETALLIC COATINGS: MANUFACTURER'S STANDARD PVC, POLYURETHANE OR POLYESTER COATING APPLIED ACCORDING TO MFMA-3.

C. PAINTED COATINGS: MANUFACTURER'S STANDARD PAINTED COATING APPLIED ACCORDING TO MFMA-3.

D. STAINLESS STEEL: TYPE 304, PER ASTM A240.

2. ALUMINUM SLOTTED SUPPORT SYSTEMS (SLOTTED CHANNEL): COMPLY WITH MFMA-3, TYPE 6063-T6, PER ASTM B221; FACTORY-FABRICATED COMPONENTS FOR FIELD ASSEMBLY; 12-GAUGE, 1-5/8-INCH BY 1-5/8-INCH; COOPER B-LINE, ERICO INTERNATIONAL CORPORATION, HILTI, INC., POWER-STRUT, THOMAS & BETTS CORPORATION, UNISTRUT.

WHERE FIELD CUTTING OF STANDARD LENGTHS OF CHANNEL ARE REQUIRED, MAKE CUTS STRAIGHT AND PERPENDICULAR TO MANUFACTURED SURFACES.

FOR FIELD-CUT OR DAMAGED SURFACES OF COATED CHANNELS, DRESS CUT ENDS, DAMAGED SURFACES, OR BOTH, WITH AN ABRASIVE MATERIAL (E.G., FILE, GRINDING STONE, OR SIMILAR) AND CLEANSER TO REMOVE OILS, RUST, SHARP EDGES AND SHARDS.

FOR CHANNEL WITH A FACTORY-APPLIED COATING, RE-FINISH CUT EDGES WITH A COATING COMPATIBLE WITH THE FACTORY FINISH AND AS RECOMMENDED BY THE MANUFACTURER (E.G., MANUFACTURER'S TOUCH-UP PAINT OR ZINC-RICH COLD-GALVANIZING COMPOUND, AS APPLICABLE).

# 16A CONCRETE BASES

PROVIDE CONCRETE BASES (E.G., HOUSEKEEPING PADS) FOR EQUIPMENT WHERE INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREÍN. CONCRETE BASES SHALL HAVE CHAMFERED EDGES. SIZE OF BASE SHALL BE A MINIMUM OF 2 INCHES GREATER THAN THE FOOTPRINT OF THE EQUIPMENT THAT IT IS SUPPORTING.

CONSTRUCT EQUIPMENT BASES OF A MINIMUM 28-DAY, 4000-PSI CONCRETE CONFORMING TO AMERICAN CONCRETE INSTITUTE STANDARD BUILDING CODE FOR REINFORCED CONCRETE (ACI 318-99) AND THE LATEST APPLICABLE RECOMMENDATIONS OF THE ACI STANDARD PRACTICE MANUAL. CONCRETE SHALL BE COMPOSED OF CEMENT CONFORMING TO ASTM C 150 TYPE I. AGGREGATE CONFORMING TO ASTM C33, AND POTABLE WATER. EXPOSED EXTERIOR CONCRETE SHALL CONTAIN 5 TO 7 PERCENT AIR ENTRAINMENT.

UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE STRUCTURAL DRAWINGS, REINFORCE EQUIPMENT BASES WITH NO. 4 REINFORCING BARS CONFORMING TO ASTM A 615 OR 6X6 - W2.9 X W2.9 WELDED WIRE MESH CONFORMING TO ASTM A185. PLACE REINFORCING BARS 24 INCHES ON CENTER WITH A MINIMUM OF TWO BARS EACH DIRECTION.

PROVIDE GALVANIZED ANCHOR BOLTS FOR EQUIPMENT PLACED ON CONCRETE BASES OR ON CONCRETE SLABS. ANCHOR BOLTS SIZE, NUMBER AND PLACEMENT SHALL BE AS RECOMMENDED BY THE MANUFACTURER OF THE EQUIPMENT.

CONCRETE EQUIPMENT BASES SHALL HAVE A MINIMUM HEIGHT OF 4 INCHES AND SHALL BE POURED-IN-PLACE.

# 16A EQUIPMENT FURNISHED BY OTHERS

PROVIDE NECESSARY EQUIPMENT AND ACCESSORIES THAT ARE NOT PROVIDED BY THE EQUIPMENT SUPPLIER OR OWNER TO COMPLETE INSTALLATION OF EQUIPMENT FURNISHED BY OTHERS, IN LOCATIONS AS INDICATED ON THE DRAWINGS, SPECIFIED HEREIN, OR BOTH. EQUIPMENT AND ACCESSORIES NOT PROVIDED BY THE EQUIPMENT SUPPLIER MAY INCLUDE SUCH ITEMS AS FLEXIBLE CORDS AND PLUGS, AS REQUIRED FOR PROPER OPERATION OF THE COMPLETE SYSTEM, IN ACCORDANCE WITH THE MANUFACTURERS' INSTRUCTIONS.

BE RESPONSIBLE FOR CORRECT ROUGH-IN DIMENSIONS, AND VERIFY THEM WITH ENGINEER, OWNER'S REPRESENTATIVE, EQUIPMENT SUPPLIER, OR ALL THREE, PRIOR TO ROUGH-IN AND SERVICE INSTALLATIONS.

IN ADDITION TO THE REQUIREMENTS OF DIVISION 1, REMOVE FROM THE PREMISES DIRT AND REFUSE RESULTING FROM THE PERFORMANCE OF THE ELECTRICAL WORK, AS REQUIRED, TO PREVENT ACCUMULATION. COOPERATE IN MAINTAINING REASONABLY CLEAN PREMISES AT ALL TIMES. IMMEDIATELY PRIOR TO FINAL INSPECTION, MAKE A FINAL CLEANUP OF DIRT AND REFUSE RESULTING FROM THE WORK. CLEAN ALL MATERIAL AND EQUIPMENT INSTALLED UNDER THIS DIVISION. REMOVE DIRT, DUST, PLASTER, STAINS AND FOREIGN MATTER FROM ALL SURFACES. TOUCH UP AND RESTORE ALL DAMAGED FINISHES TO THEIR ORIGINAL CONDITION.

### 16A ADJUSTING, ALIGNING AND TESTING

ADJUST, ALIGN, AND TEST ALL ELECTRICAL EQUIPMENT ON THIS PROJECT PROVIDED UNDER THIS DIVISION AND ALL ELECTRICAL EQUIPMENT FURNISHED BY OTHERS FOR INSTALLATION OR WIRING UNDER THIS DIVISION, FOR PROPER OPERATION.

TEST ALL SYSTEMS AND EQUIPMENT ACCORDING TO THE REQUIREMENTS IN NETA ATS (LATEST EDITION) AND ALL ADDITIONAL REQUIREMENTS SPECIFIED IN FOLLOWING SECTIONS.

MAINTAIN THE FOLLOWING ON THE PROJECT PREMISES AT ALL TIMES: A TRUE RMS READING VOLTMETER, A TRUE RMS READING AMMETER, AND A MEGOHMMETER INSULATION RESISTANCE TESTER. PROVIDE TEST DATA READINGS AS REQUESTED OR AS REQUIRED BY THE ENGINEER.

## 16A EQUIPMENT IDENTIFICATION

## PROVIDE EQUIPMENT IDENTIFICATION NAMEPLATES:

ON ALL PANELBOARDS, SWITCHES, STARTERS, DIMMERS, SWITCHES IN DISTRIBUTION PANELBOARDS AND SWITCHBOARDS.

WHERE INDICATED ON THE DRAWINGS.

ENGRAVED, CONTRASTING COLOR, THREE-LAYER, LAMINATED PLASTIC INDICATING THE NAME OF THE EQUIPMENT, LOAD, OR CIRCUIT AS DESIGNATED ON THE DRAWINGS AND IN THE SPECIFICATIONS:

FIELD-APPLIED PERMANENT EPOXY ADHESIVE, COMPATIBLE WITH THE EQUIPMENT FINISH.

SELF-ADHERING, WITH A PERMANENT, WEATHERPROOF ADHESIVE.

ATTACHED WITH STAINLESS STEEL SCREWS AND HARDWARE

ATTACHMENT METHOD SHALL BE ACCEPTABLE TO THE MANUFACTURERS OF THE EQUIPMENT TO WHICH THE NAMEPLATES ARE BEING APPLIED.

COLOR: BLACK BACKGROUND WITH WHITE LETTERS FOR NORMAL POWER; RED BACKGROUND WITH WHITE LETTERS FOR EMERGENCY POWER. LETTER HEIGHT: 1/2-INCH MINIMUM.

## <u>16A SYSTEM START UP</u>

PRIOR TO STARTING UP THE ELECTRICAL SYSTEMS:

- 1. CHECK ALL COMPONENTS AND DEVICES.
- 2. LUBRICATE ITEMS ACCORDINGLY.
- TIGHTEN SCREWS AND BOLTS FOR CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A AND
- 4. ADJUST TAPS ON EACH TRANSFORMER FOR RATED SECONDARY VOLTAGE WHEN THE TRANSFORMER IS AT MINIMUM LOAD.
- 5. CHECK AND RECORD BUILDING'S SERVICE ENTRANCE VOLTAGE, GROUNDING CONDITIONS, GROUNDING RESISTANCE, AND PROPER PHASING.
- 6. REPLACE ALL BURNED-OUT LAMPS AND LAMPS USED FOR TEMPORARY CONSTRUCTION LIGHTING IN PERMANENT LIGHT FIXTURES.
- 7. BALANCE ALL SINGLE-PHASE LOADS AT EACH PANELBOARD, REDISTRIBUTING BRANCH CIRCUIT CONNECTIONS UNTIL BALANCE IS ACHIEVED. DO NOT TYPE UP FINAL PANELBOARD DIRECTORIES UNTIL ALL RE-BALANCING AND REDISTRIBUTION OF CIRCUITS ARE COMPLETE. TURN ON ALL LOADS IN AN ATTEMPT TO MAXIMIZE THE LOAD ON THE PANEL AND TAKE AMPERE READINGS ON EACH OF THE PHASES BEFORE REDISTRUBITNG CIRCUITS AND BALANCING THE PANEL.
- 8. AFTER ALL SYSTEMS HAVE BEEN INSPECTED AND ADJUSTED, CONFIRM ALL OPERATING FEATURES REQUIRED BY THE DRAWINGS AND SPECIFICATIONS AND MAKE FINAL ADJUSTMENTS AS NECESSARY.

# 16A EXISTING EQUIPMENT REUSE AND REMOVAL

REMOVE ALL EXISTING WIRING, LIGHT FIXTURES, EXPOSED CONDUITS AND OTHER ELECTRICAL INSTALLATIONS NOT REUSED PRIOR TO SUBSTANTIAL COMPLETION OF THE WORK.

EXISTING RACEWAYS MAY BE REUSED IF THEIR POINTS OF TERMINATIONS ARE SUITABLE; IF THEY ARE CLEAN INSIDE WITH NO EVIDENCE OF RUST OR BURRS; IF FREE FROM CRACKS, FLATTENED SECTIONS OR SHARP BENDS; AND, IF SUITABLY LOCATED TO AVOID CONFLICTS WITH OTHER TRADES OR INSTALLATIONS. CAREFULLY "FISH" ALL EXISTING CONDUITS REUSED UNDER THIS CONTRACT TO REMOVE ALL DEBRIS AND OBSTRUCTIONS, AND SWAB UNTIL ALL MOISTURE IS

CUT, PATCH, AND REPAIR WHERE REQUIRED FOR NEW ELECTRICAL INSTALLATIONS, AND PATCH AND REPAIR ALL SURFACE DAMAGE RESULTING FROM THIS WORK. CUT FLUSH WITH THE FLOOR AND PLUG AT BOTH ENDS, RACEWAYS STUBBED ABOVE THE FLOOR AND NOT USED AT SUBSTANTIAL COMPLETION OF THE WORK.

RELOCATE ALL EXISTING ELECTRICAL SYSTEMS REQUIRED TO BE IN OPERATION AT SUBSTANTIAL COMPLETION OF THE CONTRACT, IF REQUIRED, AS A RESULT OF WORK INCLUDED UNDER THIS CONTRACT, EVEN IF NOT SPECIFICALLY INDICATED IN THE DRAWINGS OR SPECIFICATIONS.

# 16A ALTERNATES

INCLUDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY FOR AND INCIDENTAL TO THE COMPLETION OF ALL WORK UNDER EACH PARTICULAR ALTERNATE. FURNISH SEPARATE BIDS FOR EACH APPLICABLE ALTERNATE, STATING THE AMOUNT TO BE ADDED TO OR DEDUCTED FROM THE BASE BID FOR EACH ALTERNATE ACCEPTED. APPLICABLE SECTIONS OF THE BASE SPECIFICATIONS APPLY TO ALL WORK REQUIRED BY THE ALTERNATES UNLESS OTHERWISE SPECIFIED. REFER TO THE ARCHITECTURAL PORTION OF THE SPECIFICATIONS FOR THE LIST OF ALTERNATES.

# SECTION 16B BASIC ELECTRICAL MATERIALS AND METHODS:

## 16B RACEWAYS

METALLIC CONDUIT AND TUBING:

ELECTRICAL METALLIC TUBING, COUPLINGS AND FITTINGS (EMT): ANSI C80.3, UL 797. ONLY STEEL PRODUCTS ALLOWED. REDUCED WALL EMT IS NOT ALLOWED

FLEXIBLE METAL CONDUIT (FMC): ZINC-COATED STEEL OR ALUMINUM, UL 1. REDUCED-WALL FMC IS NOT ALLOWED

INTERMEDIATE METAL CONDUIT (IMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT: ANSI C80.6, UL 1242.

LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC): FLEXIBLE STEEL CONDUIT WITH PVC JACKET: UL 360

RIGID METAL CONDUIT (RMC): HOT-DIP GALVANIZED RIGID STEEL CONDUIT (GRS): ANSI C80.1, UL 6.

RIGID ALUMINUM CONDUIT (RAC): ANSI C80.5, UL 6A.

PLASTIC-COATED IMC, RMC, AND FITTINGS: NEMA RN 1, UL LISTED.

IMC AND RMC FITTINGS: NEMA FB 1; COMPATIBLE WITH CONDUIT TYPE AND MATERIAL, UL LISTED

### NON-METALLIC CONDUIT AND TUBING:

RIGID NONMETALLIC CONDUIT (RNC): SCHEDULE 40 PVC, 90 DEG C RATED, NEMA TC-2, UL 651; FITTINGS: NEMA TC 3, TC 6; UL 514, COMPATIBLE WITH CONDUIT/TUBING TYPE AND MATERIAL, UL LISTED.

### 16B RACEWAY INSTALLATION

INSTALL ALL CIRCULAR RACEWAYS CONCEALED ABOVE SUSPENDED CEILINGS OR CONCEALED IN WALLS OR FLOORS WHEREVER POSSIBLE EXCEPT WHERE OTHERWISE INDICATED.

PROVIDE GRS FOR ALL CONDUITS RUN EXPOSED TO WEATHER, OR EXPOSED TO OTHER HAZARDOUS CONDITIONS.

ALL OTHER RACEWAY MAY BE EMT WHERE APPROVED BY LOCAL CODE. USE COMPRESSION TYPE FITTINGS FOR EMT, WITH ALL FITTINGS UL LISTED FOR THE

# **EQUIPMENT CONNECTIONS**

CORRESPONDING TRADE ELBOW.

NECESSARY OR INDICATED.

ENVIRONMENT IN WHICH THEY ARE USED.

USE FMC FOR FINAL CONNECTION TO EACH MOTOR AND TRANSFORMER, AND TO ANY DEVICE THAT WOULD OTHERWISE TRANSMIT MOTION, VIBRATION, OR NOISE. USE LFMC WHERE EXPOSED TO LIQUIDS, VAPORS OR SUNLIGHT, AND TO CONNECT TO KITCHEN AND FOOD SERVICE EQUIPMENT. PROVIDE ALL FMC AND LFMC WITH AN INSULATED BONDING CONDUCTOR.

USE ONLY METAL RACEWAYS FOR ALL POWER WIRING FROM THE OUTPUT OF VARIABLE FREQUENCY DRIVES TO THEIR RESPECTIVE MOTORS.

GENERAL RACEWAY INSTALLATION REQUIREMENTS INSTALL RACEWAYS PARALLEL AND PERPENDICULAR TO BUILDING LINES.

INSTALL RACEWAYS TO REQUIREMENTS OF STRUCTURE AND TO REQUIREMENTS OF ALL OTHER WORK ON THE PROJECT; TO CLEAR ALL OPENINGS, DEPRESSIONS,

PIPES, DUCTS, REINFORCING STEEL, AND OTHER IMMOVABLE OBSTACLES. INSTALL RACEWAYS SET IN FORMS FOR CONCRETE STRUCTURE IN SUCH A MANNER

THAT INSTALLATION WILL NOT AFFECT THE STRENGTH OF THE STRUCTURE.

EXCEPT WHERE APPROVED IN WRITING BY THE ENGINEER, INSTALL NO RACEWAY IN A SLAB-ON-GRADE. LOCATE RACEWAY BELOW GRANULAR FILL BELOW SLABS-ON-

INSTALL RACEWAYS CONTINUOUS BETWEEN CONNECTIONS TO OUTLETS, BOXES AND CABINETS WITH A MINIMUM POSSIBLE NUMBER OF BENDS AND NOT MORE THAN THE EQUIVALENT OF FOUR 90-DEGREE BENDS BETWEEN CONNECTIONS. USE MANUFACTURED ELBOWS FOR ALL 45- AND 90-DEGREE BENDS, UNLESS APPROVED BY THE ENGINEER IN ADVANCE. MAKE OTHER BENDS SMOOTH AND EVEN AND WITHOUT FLATTENING RACEWAY OR FLAKING GALVANIZING OR ENAMEL. RADII OF BENDS SHALL BE AS LONG AS POSSIBLE AND NEVER SHORTER THAN THE

USE LONG RADIUS ELBOWS FOR ALL UNDERGROUND INSTALLATIONS, WHERE

SECURELY FASTEN RACEWAYS IN PLACE WITH APPROVED STRAPS, HANGERS AND STEEL SUPPORTS AS REQUIRED. ATTACH RACEWAY SUPPORTS TO THE BUILDING STRUCTURE. HANG SINGLE RACEWAYS FOR FEEDERS WITH MALLEABLE SPLIT RING HANGERS WITH ROD AND TURNBUCKLE SUSPENSION FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. CLAMP GROUPS OF HORIZONTAL FEEDER RACEWAYS TO STEEL CHANNELS THAT ARE SUSPENDED FROM INSERTS SPACED NOT OVER 10 FEET APART IN CONSTRUCTION ABOVE. SECURELY CLAMP VERTICAL FEEDER RACEWAYS TO STRUCTURAL STEEL MEMBERS ATTACHED TO STRUCTURE. INSTALL CABLE CLAMPS FOR SUPPORT OF VERTICAL FEEDERS WHERE REQUIRED. ADD RACEWAY SUPPORTS WITHIN 12 INCHES OF ALL BENDS, ON BOTH SIDES OF THE BENDS. DO NOT SUPPORT RACEWAYS FROM SUSPENDED CEILING

REAM RACEWAY ENDS, THOROUGHLY CLEAN RACEWAYS BEFORE INSTALLATION, AND KEEP CLEAN AFTER INSTALLATION. PLUG OR COVER OPENINGS AND BOXES AS REQUIRED TO KEEP RACEWAYS CLEAN DURING CONSTRUCTION AND FISH ALL RACEWAYS CLEAR OF OBSTRUCTIONS BEFORE PULLING CONDUCTORS WIRES. PROVIDE RACEWAYS OF AMPLE SIZE FOR PULLING OF WIRE AND NOT SMALLER THAN CODE REQUIREMENTS AND NOT LESS THAN 1/2-INCH IN SIZE, UNLESS INDICATED OTHERWISE ON DRAWINGS. HOMERUNS CONTAINING MORE THAN ONE BRANCH CIRCUIT SHALL NOT BE LESS THAN 3/4- INCH IN SIZE.

PROTECT ALL RACEWAY INSTALLATIONS AGAINST DAMAGE DURING CONSTRUCTION. REPAIR ALL RACEWAYS DAMAGED OR MOVED OUT OF LINE AFTER ROUGHING-IN TO MEET ENGINEER'S APPROVAL WITHOUT ADDITIONAL COST TO THE OWNER.

ALIGN AND INSTALL TRUE AND PLUMB ALL RACEWAY TERMINATIONS AT PANELBOARDS, SWITCHBOARDS, MOTOR CONTROL EQUIPMENT AND JUNCTION

INSTALL APPROVED EXPANSION/DEFLECTION FITTINGS WHERE RACEWAYS PASS THROUGH (IF EMBEDDED) OR ACROSS (IF EXPOSED) EXPANSION JOINTS. ALSO WHEN USING RNC OR RAC IN EXPOSED ENVIRONMENTS IN ACCORDANCE WITH THE NEC AND EXPANSION/CONTRACTION PROPERTIES OF RNC OR RAC.

**CONSULTANTS: L**ENGINEERS LENEXA KS 66214

TEL 913 742 5000 FAX 913 742 500

www.hei-eng.com

KS. CORPORATE NUMBER: E-325 EXPIRES 12/31/12



COPYRIGHT 2015 TOMPKINS ASSOCIATES, INC DBA/ TOMPKINS ARCHITECTS. ALL RIGHTS RESERVED. NO PART OF THESE OCUMENTS MAY BE REPRODUCED ANSMITTED IN ANY FORM OR BY ANY OTHERWISE, WITHOUT THE PRIOR

**SPECIFICATIONS** 

VA CMOP EYE WASH AND WELDING HOOD

5000 S 13TH STREET, LEAVENWORTH, KS 66048

VA770-15-P-0799

A/E Project Number 2015-06

V/A Project Number

Drawing Number

VA CMOP

Consolidated Mail

5000 S 13TH STREET,

Outpatient Pharmacy

LEAVENWORTH, KS 66048

**Veterans Affairs** 

TRANSMIT SUBMITTALS AS EARLY AS REQUIRED TO SUPPORT THE PROJECT THAN 5 YEARS. SCHEDULE. ALLOW FOR TWO WEEKS ENGINEER REVIEW TIME, PLUS MAILING TIME, PLUS A DUPLICATION OF THIS TIME FOR RESUBMITTALS, IF REQUIRED. TRANSMIT

> OR FOR NOT COORDINATING ITEMS WITH ACTUAL BUILDING CONDITIONS. REFER TO DIVISION 1 FOR ACCEPTANCE OF ELECTRONIC SUBMITTALS FOR THIS PROJECT. FOR ELECTRONIC SUBMITTALS, CONTRACTOR SHALL SUBMIT THE DOCUMENTS IN ACCORDANCE WITH THE PROCEDURES SPECIFIED IN DIVISION ' AND PASSWORD INFORMATION NEEDED TO ACCESS THE SUBMITTALS. FOR SUBMITTALS SENT BY E-MAIL, CONTRACTOR SHALL COPY THE ARCHITECT AND ENGINEER'S DESIGNATED REPRESENTATIVES. CONTRACTOR SHALL ALLOW THE

TEST REPORTS AS DEFINED IN NETA ATS FOR THE SYSTEMS AND EQUIPMENT

NAMES, ADDRESSES, TELEPHONE NUMBERS, AND E-MAIL ADDRESSES OF LOCAL CONTACTS FOR WARRANTEE SERVICES AND SPARE PARTS.

SUBMIT MANUALS PRIOR TO REQUESTING THE FINAL PUNCH LIST AND BEFORE ANY COMPLETION OF, AND BEFORE FINAL ACCEPTANCE OF, THE WORK.

ALL RACEWAY SEALS ARE EFFECTIVE.

REPLACEMENTS WITHOUT ANY ADDITIONAL COSTS TO THE OWNER.

COMMENCEMENT DATE AND TERM.

ARCHITECT:

Project Title